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SPECIFICATION FOR
VIBRATION GALVANOMETERS

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SPECIFICATION FOR VIBRATION GALVANOMETERS

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SPECIFICATION FOR VIBRATION GALVANOMETERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 December 1975, after the draft finalized by the Electrical Instruments Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 Vibration galvanometer is mostly used to measure a small quantum of alternating current or as a null detector in ac bridges. It consists of a strong permanent magnet with a moving coil suspended in its field. The moving system carries a small mirror which reflects a beam of light over the scale. Light spot on the scale is provided with a vertical hair line. The vibration galvanometer may either be with built-in lamp and scale or be used with a separate lamp and scale arrangement placed at a distance of one metre.

0.2.1 Vibration galvanometer has a fixed resonance frequency where it gives maximum band of light on the scale. The galvanometer is tunable to ± 1 Hz. A mechanical zero adjustment is also provided on the galvanometer.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies requirements and tests for ac vibration galvanometers.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Galvanometer — An instrument intended for measuring or detecting currents that are usually very small.

*Rules for rounding off numerical values (*revised*).

2.2 Vibration Galvanometer — A galvanometer in which the natural period of vibration of the moving element may be adjusted so that it is equal to that of the current which is being measured or indicated.

2.3 Magnetic Shunt — A piece of iron designed to carry part of the flux of a magnet or electromagnet in a measuring instrument in order to control its action.

2.4 Sensitivity — The current in μA that shall be passed through the galvanometer in order to produce a deflection of 1 mm on the scale at rated frequency. In the non-built-in lamp and scale type, sensitivity shall be specified in terms of deflection of 1 mm on the scale placed at a distance of one metre from the galvanometer moving system at rated frequency.

2.5 Galvanometer Impedance — The impedance offered by the moving coil system at the terminals at its resonance frequency.

2.6 Pointer — An optical device a component of which (generally a mirror) is attached to the moving element so that its movement is indicated by a spot of light moving over a scale.

2.7 Zero Shift — The change in the rest position of the pointer from the zero position before and after the deflection.

2.8 Resonance Frequency — The frequency of the source to which the galvanometer is tuned to give maximum deflection.

2.9 Rated Resonance Frequency — Resonance frequency declared by the manufacturer.

2.10 Type Tests — Tests carried out to prove conformity with the requirements of this specification. These are intended to prove the general qualities and design of a given type of vibration galvanometer.

2.11 Routine Tests — Tests carried out on each vibration galvanometer to check requirements likely to vary during production.

3. GENERAL REQUIREMENTS

3.1 The permanent magnet shall have high coercivity with the required flux density.

3.2 The resistance wires used shall be suitable from the point of view of temperature coefficient, thermo-emf to copper and resistivity.

4. WORKMANSHIP AND FINISH

4.1 All parts liable to rust shall be given a suitable corrosion preventive finish.

4.2 The magnets shall be well aged.

4.3 Paints, lacquers or any other material used for surface finish shall be hard and smooth so that clearing of accumulated dust shall be facilitated.

4.4 Spring washers, lock nuts or similar devices shall preferably be used for fixing binding posts to ensure that they do not become loose in use.

4.5 The case shall be so made as to prevent ingress of dust and other particles.

4.6 Soldering and brazing shall preferably be done with a non-corrosive flux. When corrosive flux is used, it shall be completely removed. Soldered joints shall present smooth and continuous appearance. All excess solder and flux shall be removed.

5. RATED RESONANCE FREQUENCY

5.1 The rated resonance frequency shall be declared by the manufacturer. The resonance frequency shall be adjustable over a range of at least ± 2 percent of the rated resonance frequency.

5.2 If required by the purchaser, an externally accessible frequency adjuster may be provided.

6. SENSITIVITY

6.1 The manufacturer shall supply the sensitivity value with the vibration galvanometer.

7. MARKING

7.1 The vibration galvanometer shall be marked with the following:

- a) Manufacturer's name or trade-mark,
- b) Type and the serial number,
- c) Nominal galvanometer impedance,
- d) Rated resonance frequency, and
- e) Country of manufacture.

7.1.1 The vibration galvanometer may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

8. TESTS

8.1 General Conditions for Tests — Unless otherwise specified, the tests shall be carried out under the following atmospheric conditions:

Temperature	15 to 35°C
Relative humidity	45 to 75 percent
Pressure	86 to 106 Pa

8.2 Classification of Tests — The tests shall be classified as follows:

- a) Type tests, and
- b) Routine tests.

8.2.1 Type Tests — The following shall constitute type tests and shall be carried out in the sequence given below:

- a) Insulation resistance test (8.3),
- b) High voltage test (8.4),
- c) Sensitivity test (8.5),
- d) Zero shift test (8.6),
- e) Test for optical system (8.7), and
- f) Test for resonance frequency (8.8).

8.2.1.1 Number of samples and criteria for conformity — Type tests shall be applied to three test specimens; in the event of one specimen failing to comply in any respect, a set of further three specimens shall be taken all of which shall comply with the requirements of this standard.

8.2.2 Routine Tests — The following shall constitute routine tests and shall be carried out in the sequence given below:

- a) Insulation resistance test (8.3),
- b) High voltage test (8.4),
- c) Sensitivity test (8.5), and
- d) Test for optical system (8.7).

8.3 Insulation Resistance Test — When the moving system is insulated from the body of the galvanometer, the insulation resistance between the two terminals connected together and the metallic body or case when measured at 500 V dc after one minute of electrification shall be not less than 100 megohms.

8.4 High Voltage Test — When the moving system is insulated from the body of the galvanometer, no breakdown, arcing or sparking shall occur when an ac voltage of 1000 V (rms) is applied across the two terminals connected together and the metallic body or case for a period of one minute.

8.5 Sensitivity Test—The sensitivity of the galvanometer when new as measured at one-fourth, half, three-fourths and full scale deflections* on both sides of centre zero on the scale shall not differ by more than 5 percent of the stated value and shall not differ among themselves by more than 2 percent of the stated value.

8.6 Zero Shift Test—The zero position of the pointer shall be noted and the galvanometer given an ac current signal to cause deflection over the full scale. The signal shall then be removed and the zero position noted again. The shift of the zero position shall not exceed 0.5 percent of full scale reading in either direction.

8.7 Test for Optical System—The component(s) used in the galvanometer for use as optical pointer shall be capable of giving a clear and well defined hair line of the spot whose thickness is not more than 0.1 of the least count of the scale when tested using the associated lamp, scale, etc.

8.8 Test for Resonance Frequency—A continuously variable frequency supply and a standard frequency meter or any other frequency measuring device shall be used for verifying the resonance frequency of the moving system.

*The full scale deflection in the case of lamp and scale galvanometer shall be 10° from either side of zero.

INDIAN STANDARDS

ON

ELECTRICAL INSTRUMENTS

IS:

- 1248-1968 Direct acting electrical indicating instruments (*first revision*)
- 1565-1966 Electrical apparatus comprising resistors (*revised*)
- 1765-1966 dc potentiometers for laboratory and industrial uses (*revised*)
- 1885 (Part XI)-1966 Electrotechnical vocabulary: Part XI Electrical measurements
- 2032 (Part X)-1969 Graphical symbols used in electrotechnology: Part X Measuring instruments
- 2419-1963 Dimensions of electrical indicating instruments
- 2442-1963 dc moving coil galvanometers
- 2992-1965 Insulation resistance testers (hand-operated)
- 3107-1974 Portable multi-purpose direct acting electrical indicating instruments (*first revision*)
- 3635-1966 Methods of test for resistance of metallic electrical resistance materials
- 3636-1966 Method of test for temperature coefficient of precision resistor wires
- 6236-1971 Direct recording electrical measuring instruments

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Automobile electrical equipment	Insulating materials
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Conductors and cables	Lamps and lamp accessories
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Electric welding equipment	Lightning arresters
Electrical installations, codes of practice	Motors and generators
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Electronic equipment	Relays
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